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BULLETIN No. 150-1

Upper Sacramento River Basin Investigation

Appendix E

PUBLIC HEARING COMMENTS

A Summary of the Public Hearing Comments on Bulletin
No. 150-1, Dated February 1969, and the Report by
the Ralph M. Parsons Company

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WILLIAM R. GIANELLI
Director
Department of Water Resources

STATE OF CALIFORNIA
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Department of Water Resources

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Upper Sacramento River Basin Investigation

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FOREWORD

This appendix, together with the preliminary edition of Bulletin No. 150 and Bulletin No. 150-1, all entitled "Upper Sacramento River Basin Investigation", serve as the complete edition of Bulletin No. 150.

This appendix summarizes the studies leading up to Bulletin No. 150-1 and discusses the public hearing comments received on it and another report, similar in scope, that was prepared by the Ralph M. Parsons Company for The Reclamation Board. The California Water Commission and The Reclamation Board held a joint public hearing on these reports in March 1969. The Commission's summary of this hearing and its recommendations concerning the two reports are included in this appendix.

Transcripts of the public hearing are on file with the California Water Commission and The Reclamation Board in Sacramento and the Northern District of the Department of Water Resources in Red Bluff and are available for review by the public.

In January 1970, following the publication of Bulletin No. 150-1 and during the preparation of these public hearing comments, the people living along the Sacramento River experienced the largest flood since the construction of Shasta Dam. Information on this flood and its relationship to Bulletin No. 150-1 is presented in an Addendum at the end of this appendix.

William R. Gianelli
William R. Gianelli, Director
Department of Water Resources
The Resources Agency
State of California
June 9, 1970

State of California
The Resources Agency
DEPARTMENT OF WATER RESOURCES

RONALD REAGAN, Governor
NORMAN B. LIVERMORE, JR., Secretary for Resources, The Resources Agency
WILLIAM R. GIANELLI, Director, Department of Water Resources
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ABSTRACT

A public hearing on the Upper Sacramento River Basin Investigation was held jointly by the California Water Commission and The Reclamation Board on March 14, 1969, in Chico. Also considered at the hearing was another report, similar in scope, that had been prepared by the Ralph M. Parsons Company for The Reclamation Board.

The study areas of the two reports overlapped. Both were concerned with the potential flood control benefits of the Upper Sacramento Valley and along the Sacramento River by virtue of upstream storage facility construction. The Department's report, Bulletin No. 150-1 published in February 1969, assessed the relative value of a bypass in the upper Butte Basin, as well as upstream storage. The Parsons Report, published in November 1968, addressed itself almost entirely to upstream storage. Both reports agree that, even with upstream storage, some form of hydraulic relief is necessary.

A petition, signed by 58 property owners within the Butte Basin and representing nearly 80 percent of the property within the upper Butte Basin was entered as testimony on the reports. The petition endorsed a program to reclaim lands within the upper Butte Basin, with a bypass system.

INTRODUCTION

Sacramento River floods, historically severe, have yet to be completely contained.

Since 1878, when William Ham Hall became the first State Engineer, each major flood has brought an increased awareness of the need for flood control and renewed attempts by engineers to come up with an effective way to supply it. Although the studies carried out over the years by agencies at all levels of government have resulted in such major accomplishments as the Sacramento River Flood Control Project and Shasta, Folsom, and Oroville Reservoirs, a few problem areas still remain.

Tributary development, a large main stem project near Red Bluff, and a Butte Basin bypass are three recurring flood control concepts. The most recent study by the State, the Upper Sacramento River Basin Investigation, reported on in Bulletin No. 150, concluded that several tributary projects are economically justified but that a large reservoir (Iron Canyon) on the Sacramento River is not. The 2-year extension of this investigation, reported on in Bulletin No. 150-1, made a reconnaissance appraisal of the flood problems within the Sacramento River Basin.

Bulletin No. 150-1 concluded that, even with upstream storage, overflows would continue to enter the upper Butte Basin during major storms and that provisions are needed to control these overflows.

To provide an independent viewpoint on the feasibility of using upstream storage to reduce floodflows, The Reclamation Board retained the Ralph M. Parsons Company to do a study. The Parsons Report, in which the results of the study are presented, discusses upstream storage as an alternative to a Butte Basin bypass and concludes that upstream storage is a potentially feasible alternative to the bypass.

In accordance with the California Water Code and department policy, a public hearing was held on both Bulletin No. 150-1 and the Parsons Report. The hearing was held jointly by the California Water Commission and The Reclamation Board in Chico on March 14, 1969. Following the hearing, the Water Commission reported to the Department of Water Resources on this hearing. The contents of this Commission report are reproduced in this appendix under the headings "Summary of Public Hearing Testimony" and "Conclusions and Recommendations".

SUMMARY OF INVESTIGATIONS

This section presents the conclusions and recommendations published in the two reports, Bulletin No. 150-1 and the Parsons Report, plus a brief comparison of the two.

Bulletin No. 150-1

"This report presents a reevaluation of five upper Sacramento River tributary reservoirs and identifies others which show a good potential for controlling floodflows and developing new water supplies. The report also presents a reconnaissance appraisal of basin-wide flood problems and potential solutions.

"It is concluded that:

1. The streams which make the largest contribution to peak floodflows in the Sacramento River are (in order of magnitude) Cottonwood Creek, Cow Creek, Stony Creek, Clear Creek, Battle Creek, Thomes Creek, Deer Creek, Mill Creek, Antelope Creek, Paynes Creek, Elder Creek, Red Bank Creek, Bear Creek, and Big Chico Creek. Of these, the flood contribution from Cottonwood and Cow Creeks is by far the largest.

2. Runoff from the Sacramento Valley floor area contributes substantially to peak floodflows in the Sacramento River during some storms. It will not be practical to develop storage projects to control this valley runoff in the foreseeable future.

3. The streams which produce the highest peak flows within their individual basins are (in order of magnitude) Cottonwood, Stony, Cow, Thomes, Battle, Clear, Deer, Mill, Elder, Antelope, Big Chico, Paynes, Red Bank, and Bear Creeks.

4. The tributary basins which now suffer the greatest annual flood damages are the Thomes Creek, Battle Creek, Cottonwood Creek, and Cow Creek Basins. The other tributary basins each receive less than \$100,000 flood damages annually.

5. Several tributary projects appear to be suitable for construction in the near future. These projects can provide needed flood protection to the tributary basins and some reduction of flood peaks on the Sacramento River. In addition to providing flood protection, they can supply water to meet local needs, provide suitable habitat for increased salmon spawning, provide water for areas of deficiency within the State, and provide new recreational environment. The individual projects which appear to be the most favorable for construction in the near future are:

Paskenta-Newville. This project on Thomes Creek and North Fork Stony Creek would provide complete flood protection to the Thomes Creek Basin and a small reduction in flood peaks on the Sacramento River. It would provide 43,000 acre-feet per year of local irrigation water and 300,000 acre-feet per year for export if integrated with the joint CVP-SWP system. It would require approximately 25 years to fill this reservoir and thereby attain this export yield. The Bureau of Reclamation is responsible for the feasibility studies of this project.

Cottonwood Creek Projects. Either two large reservoirs (Dutch Gulch and Farquhar School) or a series of at least four smaller reservoirs (Hulen, Dippingvat, Rosewood, and Fiddlers) appear to be suitable means of providing flood protection to the Cottonwood Creek Basin as well as serving local needs. The large reservoirs would provide a greater reduction in Sacramento River floodflows and more water for export to other areas of need. By interagency agreement, the Corps of Engineers is responsible for studies to select the best plan of development for this basin.

Millville. This project on South Cow Creek could provide some flood protection for the Cow Creek Basin and along the Sacramento River. Additions to this project and construction of other projects within the Cow Creek Basin would be necessary to obtain a high degree of flood protection.

Wing. This project could deliver excess flows from Battle and Paynes Creeks to a reservoir on Inks Creek. Water conserved in Wing Reservoir could yield 50,000 acre-feet of new yield to other areas of the State as well as provide flood protection.

Deer Creek Meadows. This project has limited flood control potential but has high recreation and fishery enhancement potential. It is capable of yielding 20,000 acre-feet of new water for local irrigation and 18,000 acre-feet of new water to the Delta.

Jonesville. This project on upper Butte Creek would provide very little additional flood protection. Levees on lower Butte Creek already provide a high degree of protection to the agricultural lands within the basin. This project would provide 25,000 acre-feet of additional water supplies to the Paradise, Cohasset, and Forest Ranch areas and provide good recreational potential.

6. In addition to these reservoirs, there are other projects which should be considered in future years. Among these

are Bella Vista Reservoir on Little Cow Creek, the Bear and Old Cow Creek diversions to Millville Reservoir, the Belle Mill Project on Antelope Creek, Galatin Reservoir on Elder Creek, and additional storage to control floodflows on Clear Creek.

7. It will be many years before all of the tributary projects are constructed. Even though some have been shown to be economically justified, their financial feasibility must be demonstrated before authorization, design, and construction can proceed.

8. Under conditions of full development of the tributary reservoir projects, flood damages will still occur within the upper Sacramento River Basin.

9. The best solution to flood problems in the upper Sacramento River Basin is a carefully integrated complex of reservoir projects, levee and bypass systems, channel maintenance, and floodplain management. This "solution" will take many years to implement.

10. The tributary reservoir projects studied during this investigation are not justified at this time for flood control alone. They must be formulated as multiple-purpose projects, and usually demands for additional water supplies will determine the timing of these projects.

11. A comprehensive plan of staged development is needed now to guide future developments in the upper Sacramento River Basin. Chapter III of this report has presented the framework for including flood control in such a plan.

12. The most immediate steps needed to reduce future flood damages are the adoption of floodplain management ordinances. The following paragraphs identify some of the more important areas where early consideration should be given to adopting floodplain management ordinances.

Along Cow Creek. This area has developed rapidly in the past few years. Subdivisions are common on lands where 10 years ago there were only farms. The lack of a large flood in the past 10 years has led residents of this area to underestimate the flood threat.

The Antelope Area East of Red Bluff. Many houses in this area suffered water damages during the 1964 floods. Since Tehama County has a floodplain management ordinance, consideration should be given to reviewing this ordinance in light of these recent hydrologic events.

Along the Sacramento River Near Hamilton City. This area east of the river is subjected to chronic flooding because all flows in excess of 150,000 cfs are forced out of the channel. At the present time, very little

residential damage occurs. Floodplain management ordinances are needed to insure that residences are kept out of this area. Bank erosion work, as part of the Chico Landing to Red Bluff Project, could be completed with the adoption of proper ordinances. Studies are also necessary to determine if levees are still economically justified along this reach of the river.

Below All New Flood Control Reservoirs. If history is any indication, it will not take long after completion of new reservoirs before urban and suburban development encroaches on stream channel lands. Land developers tend to underestimate the flood potential after a project is completed. Floodplain management ordinances should be an integral part of any new flood control project.

13. With full development of potential upstream storage projects, overflows from the Sacramento River will continue to enter the upper Butte Basin during major storms. Provisions are needed to control the location of these overflows and to allow them to pass safely through the upper basin and into the lower Butte Basin.

"It is recommended that:

1. A comprehensive plan of staged development for the upper Sacramento River Basin be developed. This plan should consider flood control, local water supplies, export projects, importation and passage of North Coast waters through the upper Sacramento River Basin, seepage problems, and other water-oriented problems within the basin.

2. The Corps of Engineers and Bureau of Reclamation continue studies of the upper Sacramento River Basin and seek authorization for projects found feasible.

3. The State Reclamation Board continue its efforts to solve the flood problems in the Butte Basin, recognizing that with full development of potential upstream storage projects, overflows from the Sacramento River will continue to enter the upper Butte Basin during major storms and that provisions are needed to control the location of these overflows and to allow them to pass safely through the upper basin and into the lower Butte Basin.

4. The counties of Shasta, Butte, and Glenn give early consideration to adopting floodplain management ordinances.

5. All counties in the upper Sacramento River Basin establish citizens advisory committees to represent them in planning for flood control and general water resources developments and to evaluate local needs for water developments."

Parsons Report

The purpose of the Parsons Report was to determine whether upstream tributary storage has the potential of being an alternative to the Bypass Plan, which would divert excess flows from the Sacramento River through the Butte Basin. The following paragraphs present the conclusions and recommendations contained in the report.

"The level of protection guideline used for Butte Basin provides for control of all floods which may occur more frequently than once in 50 years. (This level of protection is consistent with the Sacramento River Project criteria which prevents approximately 90 percent of flood damages in that area.) This goal is interpreted to mean that no lands in the Upper Butte Basin will be flooded by floods of lesser magnitude than those expected to occur on an average of once in 50 years. The magnitude of the once in 50-year flood at Ord Ferry is presently estimated to be 210,000 c.f.s. With the upstream storage as indicated in this report, this value would be reduced to 150,000 c.f.s. by 1980; 120,000 c.f.s. by 1990; and 106,000 c.f.s. by 2020.

"Development time for upstream tributary storage projects is estimated to take about 10 to 15 years. Therefore, it is unlikely that any projects would be implemented before 1980.

"With conditions as they exist today, overflow into Butte Basin begins when the flow of the Sacramento River at Ord Ferry is approximately 90,000 c.f.s. On this basis, overflow into Butte Basin is expected to occur almost once every year. The situation could be alleviated, somewhat, by completing the eastside levee to Chico Landing which would eliminate the flooding that normally occurs when flows at Ord Ferry are below 150,000 c.f.s. This would reduce the frequency of flooding to once in every 6-1/2 years. Based on current commitments, some form of hydraulic relief in the levee near Chico Landing would be required to prevent flows in excess of 150,000 c.f.s. from damaging the downstream flood control works.

"In the event the first increment of 5 upstream tributary storage projects and a levee are implemented by 1980, once in 50-year protection would be achieved; that is, the once in 50-year peak flow would be below the 150,000 c.f.s. channel capacity. The upstream tributary storage development plan would essentially eliminate the need for a bypass in Butte Basin by 1980.

"By the year 2020, when all 13 upstream tributary storage projects and a levee are implemented, the frequency of overflows near Chico Landing would be once in 70 years. Overflow would occur, via some form of hydraulic relief such as a weir or fused plug, when the flow of the Sacramento River near Chico Landing exceeds the downstream channel capacity (150,000 c.f.s.).

"As a result of the work performed in accomplishing this study, the following recommendations were made:

1. The upstream tributary storage plan presented in this report should be analyzed and evaluated by The Reclamation Board as an alternate to the current Bypass Plan.

2. The level of detail of the upstream tributary storage plan should be increased to be consistent with the other alternatives for comparison, evaluation, and eventual selection by The Reclamation Board. In particular, the flood situation during the interim period (prior to implementation) should be evaluated in depth for each alternative.

3. In order to provide as much protection as possible before 1980, it is recommended that an eastside levee, with some form of hydraulic relief such as a weir or fused plug, be constructed as soon as possible to prevent flooding in Butte Basin when flows occur on the Sacramento River of less than 150,000 c.f.s. The hydraulic relief is to meet outstanding commitments and is not a direct requirement of the upstream tributary storage projects.

4. Every possible influence should be exerted by The Reclamation Board to hasten the completion of studies, authorization, funding, designs, and construction on the major projects such as Dutch Gulch and Farquhar, Paskenta and Newville, Wing, Bella Vista, Cow and Bear, and Clear Creek.

The first 2 projects are approaching the authorization stage. The others are not. All 13 projects should be pushed for early completion by The Reclamation Board. No matter what plan or combination of plans eventually selected to resolve the flooding in Butte Basin, upstream tributary storage projects would assist in reducing the magnitude of the flood control problem.

5. The capability of The Reclamation Board to participate in the various levels of project development should be evaluated and, if necessary, upgraded in order that they may exert a positive influence on the resolution and solution to flood control problems of the Sacramento River.

6. An integrated comprehensive plan for the coordinated development of the water resources in the Upper Sacramento Basin is needed. With a water deficit eminent in California's future, and importation plans being considered, it behooves responsible Californians to seek efficient and optimum use of our internal water resources. Piecemeal construction of facilities by independent agencies, each with different prime motives, is not likely to result in maximum benefit to present and future generations. For this reason, it is recommended that The Reclamation Board actively pursue an integrated plan for the Upper Sacramento River."

A Comparison of Bulletin No. 150-1
and the Parsons Report

Bulletin No. 150-1

Parsons Report

Purpose -- To reevaluate five tributary reservoir projects as requested by the Legislature in 1966 (Assembly Concurrent Resolution No. 18) and make a reconnaissance appraisal of the potential for controlling floods and reducing damages in the upper Sacramento River Basin. Evaluations were made of all possible methods of reducing flood damages along the Sacramento River and its major tributaries, including reservoir projects, levee and bypass systems, channel maintenance, and floodplain management.

Methods -- Each tributary and reach of the Sacramento River was evaluated to determine the best solution to reducing flood damages. Prior studies by the Department and current studies by the Department, the Bureau of Reclamation, and the Corps of Engineers were utilized. Reservoir projects which appeared to have the potential for construction in the near future were evaluated to determine their potential for reducing tributary and Sacramento River floodflows.

Conclusions -- Several tributary projects appear to be suitable for construction in the near future and these projects are not justified for flood control alone. Their financial feasibility must be demonstrated before authorization, design,

Purpose -- To determine whether upstream tributary storage has the potential of being an alternative to the Bypass Plan, which diverts excess flows from the Sacramento River through the Butte Basin. The tributary reservoir projects were formulated to reduce the statistical probability of floodflows entering upper Butte Basin to a 2 percent chance of yearly occurrence.

Methods -- Several damsites on each major tributary were analyzed to determine their potential for reducing floodflows at Chico Landing. This analysis was based upon previous and current work done by the Department, the Bureau of Reclamation, and the Corps of Engineers. A benefit-cost analysis was made on each project to determine if the project was economically justified at the present time. For those projects found to be unjustified at the present time, the benefits were indexed upwards to determine at what time in the future the project would be economically justified.

Conclusions -- Five projects are economically justified by 1980. The five projects, when coupled with a levee on the east side of the river from Ord Ferry to Chico Landing, would provide the (upper) Butte Basin with once-in-fifty-year flood protection. Some form

and construction can proceed. The best solution to flood problems in the upper Sacramento River Basin is a carefully integrated complex of reservoir projects, levee and bypass systems, channel maintenance, and floodplain management. The most immediate steps needed to reduce future flood damages are the adoption of floodplain management ordinances. With full development of potential upstream storage projects, overflows from the Sacramento River will continue to enter the upper Butte Basin during major storms. Provisions are needed to control the location of these overflows and to allow them to pass safely through the upper basin and into the lower Butte Basin.

of hydraulic relief in the levee near Chico Landing would be necessary to prevent flows in excess of 150,000 cfs from damaging downstream flood control works. Once-in-seventy-year flood protection would be possible by the year 2020 by adding eight additional projects as they become economically justified.

SUMMARY OF PUBLIC HEARING TESTIMONY

The following summary was prepared by the California Water Commission.

"On March 14, 1969, the California Water Commission and The Reclamation Board held a joint Public Hearing in Chico on the Department of Water Resources Bulletin 150-1, "Upper Sacramento River Basin Investigation", and the report to The Reclamation Board by the Ralph M. Parsons Company, "Sacramento River Upstream Storage Investigation". Chairman Ira J. Chrisman of the Commission presided. Other Commissioners on the hearing panel were Clare W. Jones, Clair A. Hill, Ray W. Ferguson, and Mal Coombs. The Reclamation Board members on the hearing panel were Wallace McCormack, Chairman, Alfred A. Souza, Ronald R. Harrington, Peter T. Hamatami, Herman H. Fendt, N. Kenneth Groefsema, and H. Wilfried Barmann.

"Bulletin 150-1 is an updating of Bulletin 150 and a reconnaissance appraisal of multi-purpose projects, including flood problems and possible solutions, in the upper Sacramento River Basin. The Parsons Report was prepared for The Reclamation Board to determine whether upstream tributary storage alone could limit flooding in Butte Basin to a two percent chance of yearly occurrence. An alternative is a plan which would safely channel excess flows from the Sacramento River through a Butte Basin bypass.

"The study areas of the two reports overlapped. Both were concerned with the potential flood control benefits of the Upper Sacramento Valley and along the Sacramento River by virtue of upstream storage facility construction. Whereas the Department's report assessed the relative value of a bypass in the Upper Butte Basin, as well as upstream storage, the Parsons Report addressed itself almost entirely to upstream storage. Both reports agree that, even with upstream storage, some form of hydraulic relief is necessary.

"A petition, signed by 58 property owners within the Butte Basin and representing nearly 80 percent of the property within the Basin, was received by the Commission and The Reclamation Board two days prior to the closing of written testimony. The Reclamation Board has checked this petition, which asks the Board and the Corps of Engineers to initiate hearings leading toward the construction of a bypass. Only three signatures, representing a small percentage of the area, are in doubt."

Appearances

Lt. Col. George B. Skinner, U. S. Army Engineer District, Sacramento, described the origin, development, and current status of the Sacramento River Flood Control Project as it relates to the Upper Sacramento River Basin; summarized the Corps' current investigations in the area; and concluded that it is highly desirable that flood control storage be provided as soon as possible on Cottonwood Creek and that construction of a weir at Chico Landing and a bypass through upper Butte Basin be seriously considered as the most practical and immediate solution to the flood problems on the upper Sacramento River. As additional storage is later provided on upper Sacramento River tributaries, the frequency of flooding in Butte Basin will be progressively decreased.

Mr. Richard Kraus, Ralph M. Parsons Company, Sacramento, presented a summary of the Ralph M. Parsons Company report to determine whether upstream tributary storage has the potential of being an alternative to a Bypass Plan which diverts excess flows from the Sacramento River through Butte Basin.

Mr. John R. Teerink, Deputy Director, Department of Water Resources, presented the summary, conclusions, and recommendations of Bulletin No. 150-1, "Upper Sacramento River Basin Investigation". The objectives of the studies conducted were to reevaluate, at the reconnaissance level, the five specific projects named in Assembly Concurrent Resolution No. 18, and make a basin-wide reconnaissance appraisal of flood problems and possible solutions in the Upper Sacramento River Basin.

Congressman Harold T. "Bizz" Johnson, made a few remarks but had no comments on the two reports.

Mr. L. B. Christiansen, U. S. Bureau of Reclamation, representing the California State-Federal Interagency Group (U. S. Bureau of Reclamation, U. S. Corps of Engineers, U. S. Soil Conservation Service, Department of Water Resources), stated that Bulletin No. 150-1 meets requirements of this interagency coordination. The Group is in agreement that the water resources of the Upper Sacramento River Basin should be developed in accordance with a comprehensive master plan and projects should be staged to meet needs of the people of these basins and the entire State.

Mr. George Weddell, U. S. Army Engineer District, Sacramento, noted that comments on Bulletin No. 150-1 were provided through the Federal-State Interagency Group by Mr. Christiansen. Commenting on the Parsons Report -- it presents an excellent reconnaissance-level reservoir plan for the ultimate solution of the flood and

related water problems on the tributaries of the Sacramento River above Chico Landing. However, the time schedule contemplated is considered unduly optimistic as many "key" reservoirs have not been recommended or authorized for construction. The current critical problem in the Upper Sacramento River Basin continues to be the flood hazard in the upper Butte Basin area.

The potential of eliminating the need for a bypass in the Butte Basin is only true if the degree of protection provided by the proposed reservoirs is adequate, if the protection can be deferred until the reservoirs are constructed, and if the resulting flood control benefits accruing from such partial protection can carry their proportional share of the costs of storage and related river works.

Mr. Hugo Hall, U. S. Bureau of Reclamation, presented testimony on the Bureau's activities in the Northern Sacramento Valley, with emphasis on multiple-purpose water resource development and cooperation with the State. To optimize developments will require coordinated operation of all project facilities. Any proposed project which would withhold water otherwise committed to use from the Delta or other diverters will need to reflect benefits foregone, or the additional costs of making up the supply to the total project.

In general, the Bureau favors multiple-purpose developments as proposed in the Parsons Report because of numerous widespread benefits and recognizes flood control as an important element of resource development activity.

Mr. William Siler, State Division of Forestry, primarily reflected technical and administrative interests and responsibilities with fire control and suppression.

Mr. Harvey M. Russo, State Department of Fish and Game, stated that Fish and Game participated in preparation of Bulletin No. 150-1, which gives considerable attention to fish and wildlife. The Parsons Report very briefly mentions fish and wildlife resources and therefore the Department of Fish and Game assumes that its areas of interest were not adequately covered. The Department strongly recommends that Recommendation No. 1 of Bulletin No. 150-1, "A Comprehensive Plan of Staged Development for the Upper Sacramento River Basin" be developed, and specifically objects to use of annual detriments to fish as a project cost in the Parsons Report.

Mr. Arnold Rummelsburg, Shasta County, stated that Bulletin No. 150-1 and the Parsons Report have identified some of the water development problems in the Sacramento River Basin, and perhaps some of the solutions to these problems.

Mr. Thomas E. Landon, Glenn County Board of Supervisors, (1) presented a resolution (No. 69-14) that the upstream tributary storage plan in the Parsons Report should not be adopted by The

Reclamation Board as an alternative to the bypass plan; (2) urged The Reclamation Board to solve flood problems in the Butte Basin in accordance with recommendations in Bulletin No. 150-1; and (3) requested The Reclamation Board to consider initiation of a study to reduce the magnitude of the presently adopted bypass plan to a plan more favorable to the majority of local interests and conducive to early implementation and construction.

Col. A. E. McCollam, The Reclamation Board, briefly described the bypass plan developed by The Reclamation Board in 1964 and discussed local responsibilities and costs.

Mr. Lee Mace, Colusa County Board of Supervisors, was interested in the width of the bypass as it enters Colusa County. He stated the need for a causeway on the Colusa-Gridley Road and raised the question as to who would be responsible for financing it.

Mr. George Stamm, Butte County Water Resources Engineer, stated that the County was in the process of discussing the various plans and had no statement at the present time. The County requested that the records be left open for the submission of a statement at a later date (see comments by Butte County Board of Supervisors, April 11, 1969, under "Written Statements", following).

Mr. J. A. Bagley, Sutter County Board of Supervisors, read a resolution (No. 69-7) endorsing the Parsons Report and urging responsible agencies to implement the recommendations.

Mr. John Luther, California Central Valley Flood Control Association, proposed the following program:

1. Early construction of river levees and works in the upper basin to control passage of river overflow through the area, together with acquisition of flowage easements.
2. Urge completion of plans and early authorization of Cottonwood Creek Project.
3. Support continued studies of other tributary reservoirs for additional construction as their financial and economic feasibility may dictate.

Mr. Lawrence Harris, Reclamation District No. 70, favored upstream storage as proposed in the Parsons Report. He was against a bypass system without adequate storage to reduce floodflows.

Mr. Sheldon Jeffers, Superior California Water Association, presented a resolution (No. 69-2) reiterating support for construction of the Paskenta-Newville and Cottonwood Creek projects at an early date. He recommended continued studies of these and

other upstream storage projects before any supplemental flood control measure is implemented in the Butte Basin.

Mr. Joe Long, President, Wild Goose-Duck Club, stated that the Duck Club Association of the East Butte Sink opposes the bypass plan and would like to have more detailed studies made on the effect of the bypass plan on the lower Butte Sink.

Mr. Ernest Hatch, Butte Basin Protection Association, applauded The Reclamation Board for getting the Parsons Report published.

Mr. Frank Clendenen, Tehama County Director of Water Resources, was generally in agreement with the need for flood control and with the proposed solutions of upstream storage and downstream channel improvements.

Mr. David W. Young, Levee District No. 3, commented that the plans involve large sums of money, neither plan eliminates flooding in Butte Basin, and storage alone on the Sacramento River will not prevent overflow into Butte Basin. The Eastside Levee Project is needed now, and is required under any plan of flood control.

Mr. Glen Harris, Butte Creek Drainage District, supported the upstream storage concept in both reports, and opposed the bypass levee proposal.

Mr. Lawrence Stefani, Glenn Land Company, stated that the levee and bypass are needed now.

Mr. George Bayse, Parrott Investment Company, stated that the proposed levee and bypass system should be constructed in the immediate future, without waiting for construction of upstream storage, projected over the next 20-50 years.

Mr. John Jaekel, farmer, urged the Board to look towards construction of a levee along the east bank of the Sacramento River and a suitable bypass structure.

Contra Costa County Water District anticipates a need for additional water above presently available Central Valley Project water and feels that planners of Upper Sacramento River Basin projects should consider this potential market.

Cottonwood Chamber of Commerce submitted a resolution expressing support for the Cottonwood Creek Project.

Written Statements

Lassen View Soil Conservation District (March 14, 1969), submitted a resolution asking federal and state agencies to

cooperate with the District in the initiation of an acceptable, economically feasible flood control plan for Salt and Antelope Creeks.

Mr. John Jaekel (March 16, 1969) submitted a statement supporting levee bypass system (in further support of personal appearance).

Drainage District No. 100 (April 10, 1969) opposed to bypass plan, supports upstream storage proposal.

Butte County Board of Supervisors (April 11, 1969) submitted Resolution No. 69-61, recommending pursuit of integrated plan for Upper Sacramento River Basin, and endorsed early construction of water conservation projects outlined in Bulletin No. 150-1 and the Parsons Report.

Northern California County Supervisors Association (April 18, 1969) submitted Resolution No. B-10-69 supporting multipurpose projects on the tributaries of the Sacramento River and urging that water demands in local areas be given full consideration and that available water surplus to future needs in the local area be considered as a source to augment needs of the State Water Facilities and the Central Valley Project.

Col. A. E. McCollam, The Reclamation Board (May 2, 1969) submitted the following comments on Bulletin No. 150-1, "Upper Sacramento River Basin Investigation".

The Reclamation Board concurs with the report recommendation that a comprehensive plan of water resources development, in the joint interests of flood control, conservation, and other purposes, be developed for the Upper Sacramento River Basin through a carefully integrated complex of reservoir projects, levee and bypass systems, channel maintenance, and floodplain management.

Due to its flood control functions and responsibilities in the Central Valley, The Reclamation Board should participate in the conception and in the development of the flood control aspects of such a plan, and requests endorsement of such joint effort.

As recommended in the report, The Reclamation Board is continuing its efforts to solve the flood problems in Butte Basin and is reappraising the alternatives available.

The Reclamation Board concurs in the recommendation for the adoption of floodplain management regulations by the upper Sacramento River counties, and suggests that if the counties do not adopt such regulations, the Board will give consideration to establishing "designated floodways".

The Reclamation Board concurs in the other recommendations contained on page 92 of the report.

St. Maurice, Helmkamp, Musser, Engineers (May 12, 1969) submitted a petition of 58 landowners representing 48,000 acres out of 60,000 total acres and endorsing a program to reclaim lands within the upper Butte Basin with a bypass system set forth in Bulletin No. 150-1. They will also support upstream multipurpose projects for flood protection, water conservation, and recreation.

Levee District No. 3, Glenn County (May 12, 1969) submitted a letter supporting the above petition and position.

CONCLUSIONS AND RECOMMENDATIONS

The Department finds that its original recommendations continue to be valid. In support of this position, the Department cites and concurs in the conclusions and recommendations of the California Water Commission following the public hearing.

"As the result of hearing on both reports, the California Water Commission concludes:

1. With regard to the Butte Basin:
 - a. The least costly alternative which would provide flood protection to the Upper Butte Basin is a bypass and related structures on the Sacramento River.
 - b. Upstream reservoirs are not a feasible alternative for a bypass, since several currently lack economic justification; even the most justified may need to be deferred for many years due to lack of foreseeable means of financing and, therefore, the projects cannot be constructed soon enough to provide adequate flood protection to the Upper Butte Basin.
 - c. Local oral testimony at the hearing indicated that support for the construction of the Butte Basin Bypass may be difficult to obtain. The local people should be aware that the schedule for construction of upstream reservoirs must, of necessity, depend upon economic justification stemming from the need for the purposes of those reservoirs and must await financing to pay for nonreimbursable costs, a major feature in several of the projects. Local people must take the risk of frequent flooding during the interim period before construction of upstream flood control space, unless a bypass is constructed.
 - d. Even if a bypass is not constructed, works along the Sacramento River adjacent to the Upper Butte Basin described in the Parsons Report, could be constructed to offer some degree of protection to the Basin.

2. A comprehensive plan of staged water resources development, including flood control, for the Upper Sacramento River Basin is needed. The Department of Water Resources has the responsibility to formulate a basin-wide master plan, and this should be accomplished through the California State-Federal Interagency Group.

3. Hydrology studies are now under way which will improve the accuracy of estimates of flood flows for the Upper Sacramento River, such as occurred during the 1964 and 1958 floods. They include model studies to investigate the hydrology and hydraulics in this area. Results of these studies may be valuable in implementing the Department's recommendations that flood plain management ordinances be expanded in the Upper Sacramento Valley and will be of value to The Reclamation Board in establishing its floodways.

4. The Paskenta-Newville Project, currently being investigated by the U. S. Bureau of Reclamation; and the Cottonwood Creek project, under study by the U. S. Army Corps of Engineers; appear to be suitable for construction in the near future.

5. The numerous projects studied by both the Department and the Parsons organization in these two reports will develop some water surplus to local needs which can be utilized in areas of water deficiency. The Central Valley Project could be a major user of this surplus water. The State Water Project may be able to utilize some of the surplus to satisfy needs of its contracting agencies and/or for other agencies which have not yet contracted for State Water Project deliveries. The amount of water, the time for reservoir filling, the delay that can be expected in funding some of the projects which have high recreation and fish and wildlife enhancement benefits, and the marginal economic justification of several of the projects makes it necessary to consider them as long-range prospects for the development of water rather than as prospects for immediate development to meet specific needs which can be foreseen at this time.

"With regard to recommendations:

1. The California Water Commission concurs that a comprehensive plan of staged development for the Upper Sacramento River Basin should be developed. We urge that the Department budget for this study and proceed with it as soon as feasible, giving full consideration to flood control, local water supplies, export projects, importation and passage of North Coastal waters to the Upper Sacramento Basin, seepage problems, and other water-oriented problems within the Basin.

2. The California Water Commission urges the Army Corps of Engineers and the Bureau of Reclamation to continue their studies within the Upper Sacramento River Basin, and urges them to seek authorization for projects found feasible.

3. The California Water Commission urges The Reclamation Board, with the cooperation of the U. S. Army Corps of Engineers, to continue its efforts to solve the flood problems of the Butte Basin and to give full consideration to the petition of local landowners. We recommend (1) proceeding with the preconstruction steps leading to an Eastside Sacramento River levee with some form of hydraulic relief, such as a weir, and (2) proceeding toward an Upper Butte Basin bypass.

4. The California Water Commission recommends that the Department of Water Resources in coordination with other agencies initiate hydrology studies to verify the accuracy of published flood discharges for the Sacramento River during times of storm such as the 1964 flood and that the results of this study be made available to counties in the Upper Sacramento Valley, so that they can proceed with more certainty to prepare adequate floodplain management ordinances."

ADDENDUM -- THE FLOOD OF JANUARY 1970

During preparation of this appendix, the Sacramento River system produced its greatest flood since the construction of Shasta Dam. Without Shasta Dam, it would have been the most severe flood of this century.

Description of the Flood

Beginning on January 8, 1970, the upper Sacramento River Basin experienced 17 consecutive days of rainfall. From January 20 to January 24, over 13 inches of rain fell at Shasta Dam. Since the basin was already saturated from previous rainfall, most of this rain became runoff and widespread flooding occurred.

The inflow to Shasta Lake was the greatest in history, both in volume and instantaneous peak flow. During this period, releases were drastically reduced. Table 1 shows a comparison of the inflow to Shasta and releases for January 1970 and for previous flood periods.

TABLE 1
COMPARISON OF SHASTA LAKE INFLOW AND RELEASES

Date	Peak Inflow :	Release	Inflow Volume
	(cubic feet per second)		(acre-feet)
February 1940 (Feb. 26-Mar. 2)	182,000	10,000	1,000,000
December 1955 (Dec. 19-26)	201,000	3,000	1,300,000
February 1958 (Feb. 15-26)	116,000	12,000	1,300,000
December 1964 (Dec. 21-27)	187,000	6,000	1,100,000
January 1970 (Jan. 13-29)	210,000	14,000	2,500,000

The tributaries of the Sacramento River below Shasta also produced high flood peaks. Cottonwood Creek flows were only slightly less than December 1964; Antelope, Battle, Mill, and Deer Creeks reached their highest levels since December 1937. As these tributary flows reached the Sacramento River, they caused the highest stages at many points along the river in recent years. Historical peak flows and January 1970 flows for the various tributaries are given in Table 2. The 1970 values are preliminary and subject to revision.

TABLE 2
HISTORICAL PEAK FLOODFLOWS

Gaging Station	Peak of Record (cfs)	Date	January 1970 (cfs) (Preliminary)
Clear Creek near Igo	24,500	12/21/55	8,300 ^{1/}
Cottonwood Creek near Cottonwood	60,000	12/22/64	58,000
Red Bank Creek near Red Bluff	9,730	1/ 5/65	8,900
Elder Creek near Paskenta	11,700	2/19/58	11,000
Thomes Creek at Paskenta	37,800	12/22/64	18,000
Stony Creek-Inflow to Black Butte	47,000	12/23/64	38,000
-near Hamilton City	39,900	2/25/58	12,500 ^{2/}
Cow Creek near Millville	45,200	12/27/51	30,500
Battle Creek near Cottonwood	35,000 est.	12/11/37	24,000
Paynes Creek near Red Bluff	10,000	12/ 1/61	8,100
Antelope Creek near Red Bluff	17,500 est.	12/11/37	17,000
Mill Creek near Los Molinos	23,000 est.	12/11/37	17,000
Deer Creek near Vina	23,800 est.	12/11/37	20,000
Big Chico Creek near Chico	9,580	1/ 5/65	9,300
Butte Creek near Chico	21,000	12/22/64	15,000

1/ Controlled by Whiskeytown Reservoir since 1963.

2/ Controlled by Black Butte Reservoir since 1963.

Relationship to Bulletin No. 150-1

The runoff pattern for the January 1970 flood was similar to that described in Bulletin No. 150-1 for typical large floods. The storm centered over the upper basin tributaries and on the lower eastside of the valley. One aspect of flooding in the upper Sacramento River not particularly emphasized in Bulletin No. 150-1 is the long periods of high sustained flow. During the flood of 1970, flows in the Sacramento River below Red Bluff exceeded 100,000 cubic feet per second for nearly two weeks. Since the Sacramento River was at a high stage prior to the heavy runoff on January 23 and 24, Antelope, Mill, and Deer Creeks contributed much more directly to the Sacramento River peak flows than they normally do. During a typical flood these streams peak and recede before the crest on the Sacramento River arrives.

The high sustained flows in the Sacramento River caused considerable bank erosion in many areas. The areas most seriously affected were located south of Redding and in the vicinity of Chico Landing and Hamilton City. The levees of the Sacramento River Flood Control Project functioned well while being subjected to long periods of high sustained flow.

Conclusion No. 12 of Bulletin No. 150-1 identified several areas where early consideration should be given to adopting floodplain management ordinances. The need for effective ordinances was dramatically demonstrated in two of these areas during the January 1970 flood.

1. The Antelope Area East of Red Bluff. The existing floodplain management ordinances in Tehama County are based upon, in part, the flood levels of 1958. Bulletin No. 150-1 cited the flooding of residences in this area in 1964 as evidence of the need for reviewing these ordinances. Flooding in this area in 1970 reemphasized this need. Since this area is still expanding, more effective management ordinances could prevent many future problems.

2. Along the Sacramento River Near Hamilton City. As was explained in Bulletin No. 150-1, very little residential damage occurs in this area. However, during the January 1970 flood, several dozen people were rescued by boat after they became isolated as floodwaters surrounded their homes. Private levees were overtopped and breached. The situation could have been more serious if the levee breaks had occurred near homes or trailers.

Serious erosion at several locations in this area could be prevented with bank revetment work. However, before this can be done, floodplain ordinances must be adopted by Butte and Glenn Counties.

The continuing erosion, private levee failures, and widespread flooding on the eastside of the Sacramento River in the vicinity of Hamilton City emphasizes the need for a complete evaluation of flood problems in this area. Such a study has been proposed by the Corps of Engineers.

The need for floodplain management ordinances below flood control reservoirs was demonstrated during the January 1970 flood. At the time Shasta Dam was constructed, the downstream channel capacity of the Sacramento River near Redding was estimated to be 79,000 cubic feet per second. However, developments in the historical floodplain have effectively reduced the nondamaging capacity. Several business establishments and residences were damaged by the 79,000-cubic-foot-per-second release from Shasta during evacuation of flood storage following the January 1970 flood.

In regard to construction of a Butte Basin bypass, Bulletin No. 150-1 pointed out that provisions should be made for flows in excess of 210,000 cubic feet per second, the design capacity of the adopted master plan. During the January 1970 flood, Butte Basin again suffered extensive damage. Though detailed hydrology studies have not been completed, it is generally acknowledged that flows passing the latitude of Ord Ferry were in the range of 240,000 to 300,000 cubic feet per second, the greatest since the construction of Shasta Dam. This flood reemphasized the need to consider a capacity greater than 210,000 cubic feet per second.

The January 1970 flood was one of the greatest on record in the Sacramento Valley but not necessarily unusual within the realm of hydrologic

probability. Certainly a larger flood could occur. It reemphasized the need for floodplain management ordinances, for continued effort to solve the Butte Basin flood problem, and for the planning and construction of projects in the upper Sacramento River Basin.

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